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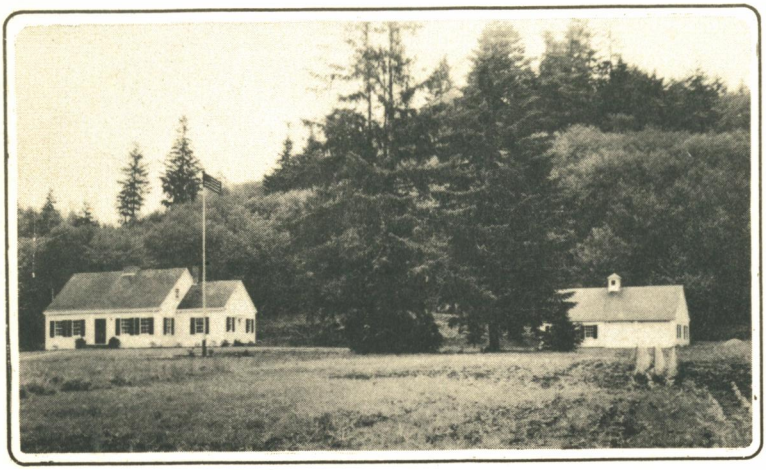
A GUIDE TO THE

CASCADE HEAD EXPERIMENTAL FOREST

ON THE OREGON COAST HIGHWAY
NEAR OTIS, OREGON



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THE 85 - 90-YEAR-OLD EVEN-AGED SITKA SPRUCE--WESTERN HEMLOCK FOREST ALONG THE SUMMIT ROAD; THIS IS THE PREVAILING TYPE ON CASCADE HEAD EXPERIMENTAL FOREST.

A GUIDE TO THE CASCADE HEAD EXPERIMENTAL FOREST

The Cascade Head Experimental Forest is one of five areas on the National Forests of the North Pacific Region which is set apart for research and demonstration purposes. Each of these forest areas is representative of a prevalent and important forest type or types. The Cascade Head Experimental Forest exemplifies conditions which are typical of the humid zone on the west slope of the Coast Range in extreme western Washington and the northern two-thirds of extreme western Oregon, the so-called "fog belt." The area lies quite centrally within this distinctive forest zone, whose principal forest cover is Sitka spruce, western hemlock, red alder, and Douglas fir, the last named being far less conspicuous than elsewhere in the "Douglas fir region."

The area is part of the Siuslaw National Forest and was set aside as an Experimental Forest by order of the Chief of the Forest Service in May, 1934 under authority of the Secretary of Agriculture.

Purpose

The broad purpose of this area, as of the other experimental forests, is to conduct studies which may promote better forest management and utilization on both public and private lands. More specifically it is the purpose here to learn the basic silvical and ecological facts about the "fog belt" forests and thereby develop the best methods of protecting, harvesting, reproducing, and managing them for maximum permanent productivity. Attention will be directed particularly to

methods of cutting spruce-hemlock stands for maximum volume and value production of pulpwood and sawlogs, to methods of handling alder stands either to convert to conifers or to maintain as alder, to stand improvement tests, to methods of reforesting old burns, to tests of exotics, and to the development of such secondary products as cascara bark.

While serving as a study area and proving ground it will also furnish demonstrations for the benefit of the profession and the industry of new technics and principles of forest management.

It is the intention to leave the strip of country next the ocean in its virgin condition for scenic and recreational purposes;it is, moreover, too wind-swept and untypical of the region to be suitable for research use. The immediate frontage on the Coast Highway will also be left in its natural condition as a scenic roadside strip.

Location - Area - Topography - Climate - Soil

This research tract lies just north of Salmon River between the summer resort colony of Neskowin and the crossroads hamlet of Otis, which is 85 miles by the "Salmon River Cut-off" from Portland and 18 miles from railhead at Grand Ronde. (See map on back cover) The Oregon Coast Highway traverses it for about 8 miles, entering the south boundary $1\frac{1}{2}$ miles north of Otis and leaving it about 2 miles southeast of Neskowin. The headquarters are 2 miles north of Otis along the highway and across Deer Creek.

Most of the area lies on a ridge between Neskowin and Deer

Creeks and extends from the precipitous ocean front at Cascade Head inland for six miles. The topography, is characteristic of the Coast Range, and is irregular, often abrupt and dissected by many small canyons. Some flat and gently rolling land occurs along the creeks and at the foot of the slopes. Elevations range from sea level to 1,750 feet.

The climate is insular with equable temperatures, much cloudiness, and frequent rains except in summer, and fogs even then. At the nearest comparable stations the normal annual precipitation, almost all in the form of rain, is between 70 and 95 inches. Days when the temperature is below freezing or above 80° F are infrequent. The seasonal and diurnal fluctuations of temperature are slight.

At the headquarters the maximum and minimum temperatures and the precipitation for the years 1936 and 1937 were as follows:

	1936	1937
Maximum temperature, F	86°	89°
Minimum temperature, F	22°	15°
Annual precipitation inches	71.5	111.0

The prevailing soils are deep residual clay loams, well watered and well drained. Rock outcrops and stony soils are unusual. Most of the soil in the forest is covered with a rather thin layer of rapidly disintegrating humus and duff.

There are almost 11,000 acres within the exterior boundaries of the experimental forest, but about 4,000 of these are at this time not

national forest land. Along the creeks and on the benchland homesteaders took claims years ago, cleared a little land, got patent, and in many cases then abandoned the land. Several of these submarginal claims have been purchased by the Farm Security Administration (formerly Resettlement Administration) and will presumably acquire national forest status and become part of the Experimental Forest. Considerable of the frontage on the Oregon Coast Highway within the exterior boundaries along Neskowin Creek is in privately-owned occupied farms.

Forest Types and Species

The greater part of this area is covered by a thrifty, quite even-aged stand of spruce and hemlock which started after a severe forest fire, thought to have been in 1846. This 85- to 90-year-old stand is dense and continuous for miles and varies from almost pure hemlock to nearly pure spruce. Toward the east end of the tract Douglas fir is a conspicuous part of the mixture. In places, veteran trees that survived the fire, are present, usually with an understory of the 85-year-old timber. Particularly along the immediate ocean frontage old-growth spruce are present, but are of a limby and wind-swept character. Nowhere is there any very extensive stand of old-growth timber.

There are patches of excellent alder of various age classes chiefly on the settlers' abandoned clearings and on the burns that originated therefrom; alder is also in mixture with the conifers. There are small areas of repeatedly burned hillsides now occupied mostly with bracken fern; there is some grassland and brush on the Cape.

The intensive cruise of this tract gives the following acreages for the several types on the gross area within the present exterior boundary. The types are named after the predominant species, though in most of the coniferous stands both spruce and hemlock are present.

Hemlock, old growth	1,294 acres
Hemlock, 90 years and younger	2,037 "
Spruce, old growth	96 "
Spruce, 90 years and younger	2,735 "
Douglas fir, old growth	9 "
Douglas fir, 90 years and younger	1,312 "
Red alder	1,806 "
Cultivated, grass, brush, nontimbered	1,490 "
Total	10,779

The cruise showed the following amounts in thousands of feet, board measure, of the several species of trees for the entire area, both publicly and privately owned within the boundaries and for the net area of national forest land (6,146 acres).

	Total Area M ft. b. m.	National Forest Land M ft. b. m.
Sitka spruce - Picea sitchensis	165,377	106,638
Western hemlock - Tsuga heterophylla	164,726	116,763
Douglas fir - Pseudotsuga taxifolia	56,778	32,304
Western red cedar - Thuja plicata	1,048	1,039
Red alder - Alnus rubra	15,017	8,686
Total	402,946	265,430

Also present in the forest are the following species: Lodgepole pine (Pinus contorta), bigleaf maple (Acer macrophyllum), bitter cherry (Prunus emarginata), cascara (Rhamnus purshiana), Pacific dogwood (Cornus nuttallii), vine maple (Acer circinatum), and willow (Salix spp.).

List of Research Projects

Research projects, the location of which is shown by key letter on the map of Cascade Head Experimental Forest, found on the reverse of this page.

A Permanent growth plots in spruce-hemlock type.

B Thinning, stand improvement, and growth in the alder type.

C Tests of exotics.

D Hybrid poplar planting.

E Cascara planting.

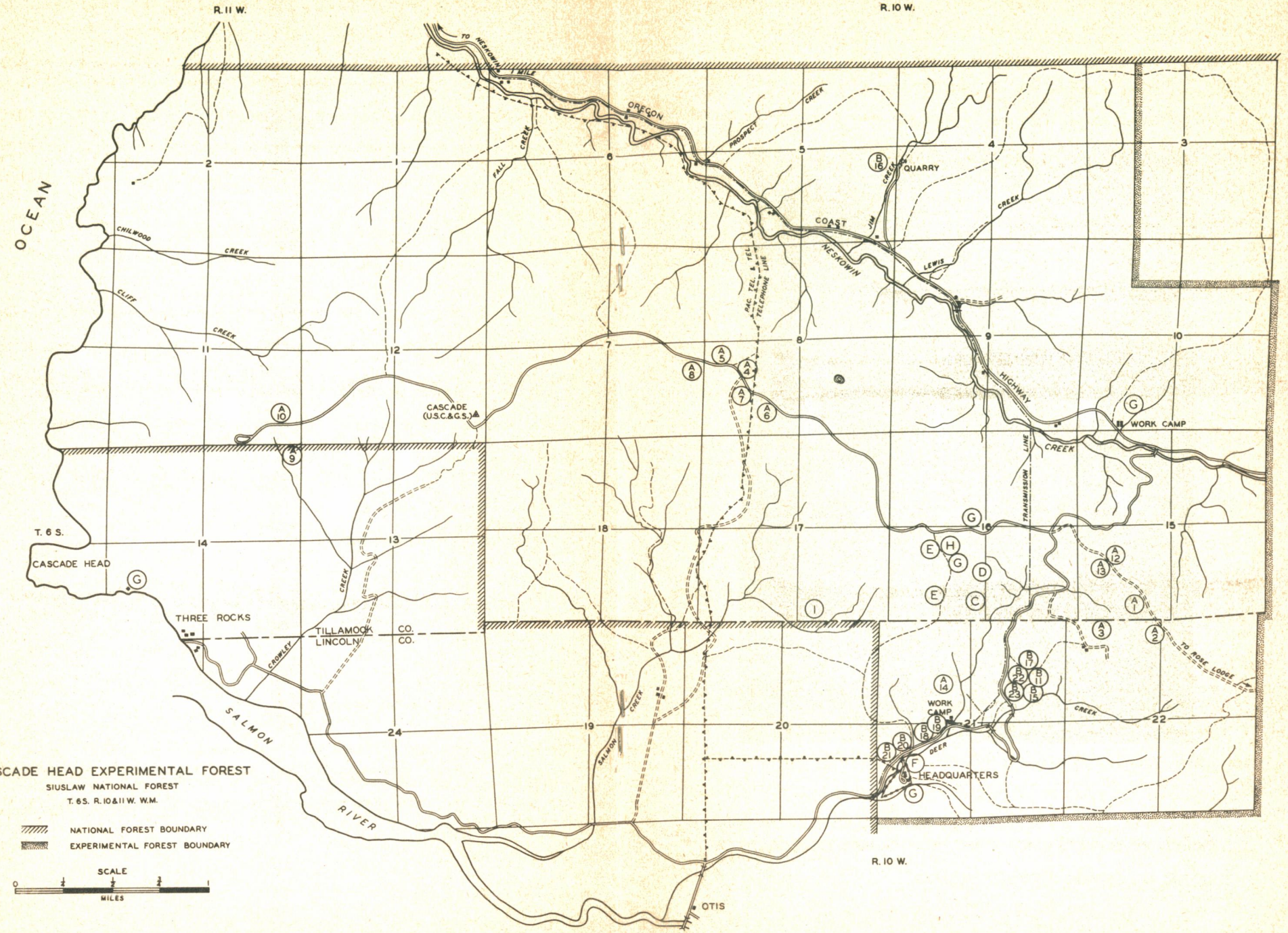
F Phenological observations.

G Climatic studies.

H Rodents in relation to forest management.

I Methods of harvesting sword fern.

The numbers, following the key letter for projects "A" and "B", are those of the individual sample plots described on pages 8 and 9.


R. 11 W.
R. 10 W.
PACIFIC OCEAN
TO NESKOWIN
OREGON
PROSPECT CREEK
FALL CREEK
QUARRY
COAST
JIM CREEK
CREEK
NESKOWIN
LEWIS
CREEK
PAC. TEL. & TEL. TELEPHONE LINE
CHILWOOD
CREEK
CLIFF
CREEK
HIGHWAY
CASCADE (U.S.C.&G.S.)
WORK CAMP
CREEK
TRANSMISSION LINE
T. 6 S.
CASCADE HEAD
THREE ROCKS
CROWLEY CREEK
TILLAMOOK CO.
LINCOLN CO.
TO ACME LODGE
WORK CAMP
CREEK
SALMON CREEK
DEER
HEADQUARTERS
SALMON RIVER
OTIS
R. 10 W.
CASCADE HEAD EXPERIMENTAL FOREST
SIUSLAW NATIONAL FOREST
T. 6 S. R. 10 & 11 W. W.M.
NATIONAL FOREST BOUNDARY
EXPERIMENTAL FOREST BOUNDARY
SCALE
0 1/4 1/2 3/4 1
MILES

A TWENTY-ONE-YEAR-OLD ALDER STAND IN WHICH SOME EXPERIMENTS IN THINNING AND PRUNING HAVE BEEN STARTED.

Wherever there is an opening in the overwood there is a luxuriant stand of undergrowth composed of the many species characteristic of the Coast Region. The 85-90-year-old stand, which covers over 60 percent of the area, often makes such a dense shade that beneath it there is but little underbrush; in the shadiest places sword fern predominates.

Development and Improvements

Immediately after this experimental forest was established, a party of cruisers made a topographic map, type map, and timber estimate which are helpful in making plans for development and use.

From 1935 to date (1938) crews of emergency work employees (either CCC, ERA, or FSA) have been engaged upon construction work to make the area ready for research and demonstration. Two semi-portable camps have been constructed and occupied.

At the headquarters (see photograph on front cover) there have been built a combination residence and office, a woodshed-garage, a 2-car garage and workshop, a gravity water system, septic tank, a rustic bridge, and an approach road. The house site and 5-acre field have been fenced, and some ground prepared for nursery beds.

A system of roads has been begun which will make all parts of the tract relatively easy of access for administration, protection, and utilization. Already work has been done on 13 miles of road, of which 7 are now in use. Supplementing the roads, 20 miles of trails have been built.

Administration

The experimental forest is an integral part of the Siuslaw National Forest, and is administered jointly by the Director of the Forest Experiment Station and the Supervisor of the National Forest. The latter protects the area from fire and trespass, superintends the construction of the transportation and communication systems, and issues and administers permits for such uses as may be approved by the Experiment Station. The Director is responsible for the maintenance of headquarters facilities, for specifying the terms under which the resources shall be cut or otherwise used, and for planning, installing, and conducting the research program, including sample plots and timber cutting experiments.

The Research Program

At the present time the growth of natural stands is being studied by means of permanent plots, certain physical factors are being measured, some experimental plantations have been made, the role of rodents to reforestation is being investigated, and some alder stands have been thinned.

Not all the research in the coastal forests can be conducted on this area itself, but some will be done on neighboring forest land. Already certain work is being done on near-by, logged-off land for which the Experimental Forest is a convenient headquarters.

The various research projects already under way on Cascade Head Experimental Forest are briefly described below. From the prefix letter

the location of each project may be found on the map at the center of this booklet. For projects "A" and "B" the location of each individual plot is also shown on the map by its number.

(A) Permanent Growth Plots in Spruce-Hemlock Type. In 1935 a series of 13 plots to study stand behavior and growth was established in representative portions of the prevailing spruce-hemlock stands, then averaging about 84 years old. The plots vary from nearly pure hemlock to pure spruce; one plot (#14) is largely Douglas fir. Some acre plots are placed in the best stands, others where the density is just average for the tract. The volumes are astonishing and testify to the high productivity of the spruce-hemlock type in even-aged stands in this soil and climate.

The following table gives some of the basic data, on an acre basis, for these plots at the time of their establishment.

Plot No.	Av. Age of Trees	No. of Living Trees	Average Diameter Inches		Vol. Trees Over 12"	Volume of All Trees Cubic Feet		
			Spruce	Hemlock	Bd. Ft. Scribner	Spruce	Hemlock	Total All Conifers
1	86	267	17.7	17.0	121,312	506	21,635	22,248
2	83	230	23.2	16.8	131,453	8,099	15,170	23,362
3	79	166	25.4	17.4	133,557	14,327	8,098	22,471
4	83	190	22.8	14.7	120,304	17,228	3,340	20,953
5	82	147	26.8	16.4	148,047	21,551	2,701	24,444
6	86	207	23.0	17.8	117,457	4,764	15,538	20,543
7	86	254	22.2	16.4	120,069	5,875	15,243	22,059
8	83	356	21.9	14.9	107,146	501	20,746	21,247
9	84	159	24.4	—	128,813	22,229	—	22,229
10	83	161	31.8	16.0	101,335	10,562	6,666	17,228
12	81	199	23.4	17.2	108,094	4,698	14,701	19,399
13	81	219	23.7	16.4	104,428	2,840	16,263	19,103
14	85	197	9.0	11.0	92,445	209	2,855	16,273

(B) Thinning, Stand Improvement, and Growth in the Alder Type. Several age classes of even-aged alder stands are present on this area, though each is small in extent. Plots have been established in three premerchantable stands (1) to test methods of thinning alder to improve volume and quality growth where alder is to be the final crop, (2) to test methods of pruning (3) to study the competition between alder and understory conifers and methods of converting to a pure type of one or the other. The following plots are already under observation for one or another of these purposes. The age shown is the approximate present age.

Plot 11 - 11-year-old alder in competition with smaller conifers.

Plot 15 - 11-year-old alder in competition with smaller conifers.

Plot 16 - 33-year-old alder suppressing conifers.

Plot 17 - 11-year-old alder in competition with conifers. Alder removed and conifers thinned to 6' x 6'.

Plot 18 - 21-year-old alder thinned to 12' x 12' and pruned. Large conifers girdled.

Plot 19 - 21-year-old alder--check plot. Conifers girdled.

Plot 20 - 21-year-old alder. All trees pruned. Conifers girdled or removed.

Plot 21 - 21-year-old alder--check plot. Conifers removed.

Plot 22 - 11-year-old alder over conifers. Alder thinned to 8' x 8'. Conifers and other competition removed.

Plot 23 - 11-year-old alder over conifers. Check plot.

(C) Tests of Exotics. This experimental forest has a climate more temperate than any other experimental forest of the Pacific North-

west and is, therefore, a good place to test the suitability for forest planting of various species that seem to have promise in this Coastal belt. So far the following have been established: Port Orford cedar, redwood, and black walnut. Other species are being grown in the nursery beds at headquarters.

(D) Hybrid Poplar Planting. A small field test of hybrid poplar supplied by the Oxford Paper Company, is a companion plantation to that on the Wind River Experimental Forest.

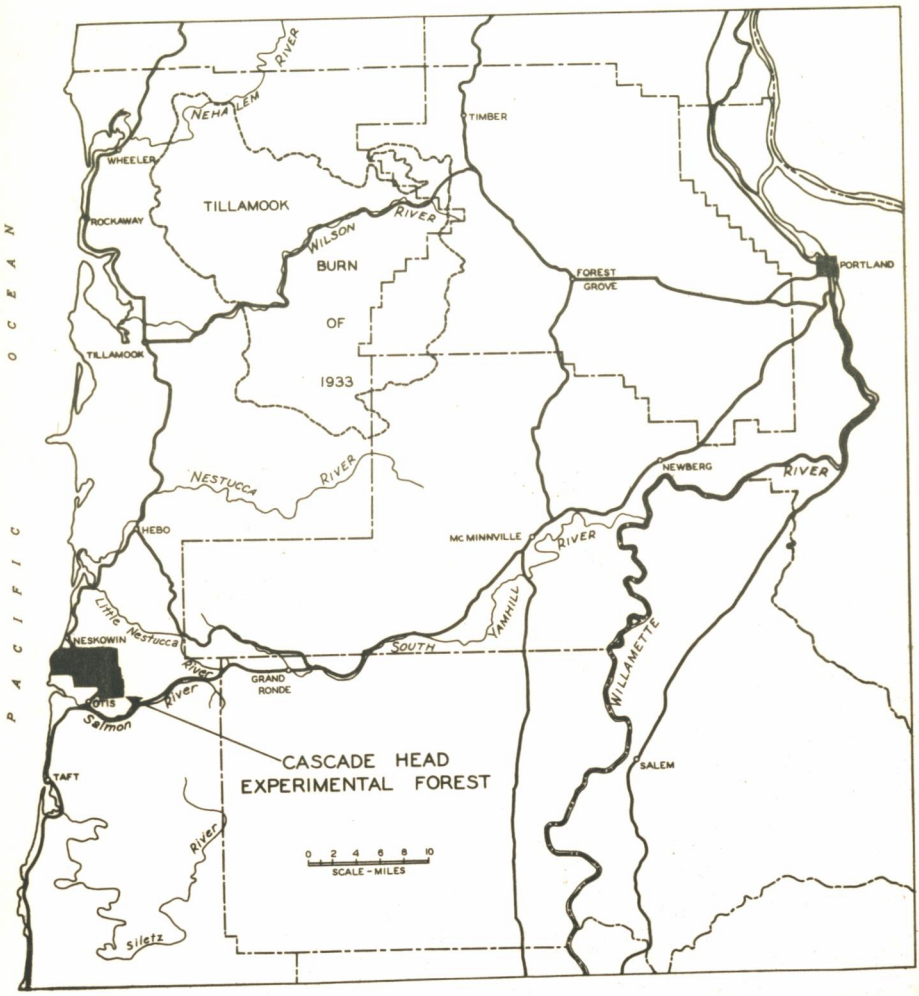
(E) Cascara. Small plantations of cascara which is optimum in this locality, but rare on this area, have been made to test methods of artificial establishment and to give stock for experimental cutting.

(F) Phenological Observations of the time of growing, leafing, flowering, and fruiting of forest trees and associated vegetation are taken weekly throughout the growing season. Similar observations are taken at 26 other points as part of a region-wide study.

(G) Climatic Studies. Temperature and precipitation records are kept yearlong at headquarters and also, through the cooperation of Mr. E. T. Allen, at a point 4 miles west near the mouth of Salmon River. For further comparison a record was kept at the FSA camp while in operation on the north side of the ridge. To arrive at a basic understanding of the distribution of precipitation on various exposures in the forest and in the open and of the role of fog drip a series of 27 rain gauges are under observation at weekly intervals. Measurements of fire danger by means of psychrometers and hazard indicator sticks are taken regularly.

(H) Rodents in Relation to Forest Management. The abundance and destructiveness of mountain beaver in the Coast Region is notable; they make artificial reforestation very difficult and are a menace to natural reproduction. In cooperation with the Biological Survey some plots have been established to study the actions of this animal and to test methods of control.

(I) Methods of Harvesting Sword Fern. Picking of sword fern fronds is a minor forest industry of considerable local importance. The effect of customary methods and seasons of picking upon plant vigor and, therefore, upon the permanence of the industry, is not known. A controlled test of seasons and intensities of picking has been started. Meanwhile, to maintain for further experimentation virgin areas of sword fern and to await the conclusions of this study, the experimental forest is closed to fern pickers.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WHEELER
TILLAMOOK
ROCKAWAY
WILSON RIVER
BURN
OF
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FOREST GROVE
PORTLAND
TILLAMOOK
NESTUCCA RIVER
NEWBERG
RIVER
HEBO
MC MINNVILLE
RIVER
Little Nestucca River
SOUTH YAMHILL
NESKOWIN
GRAND RONDE
WILLAMETTE
Salmon River
CASCADE HEAD
EXPERIMENTAL FOREST
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SCALE - MILES